

AR 602 4-32

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# MMTS OU III Lower Montezuma Creek DOE ID Nos. MG-01028-VL, MG-01029-VL, and MG-01030-VL Removal Action Design

May 1998

MRAP OUIII AR 602 4-32 MONTEZUMA CREEK  
MMTS OUIII LOWER MONTEZUMA CREEK REMOVAL  
ACTION DESIGN 5/98



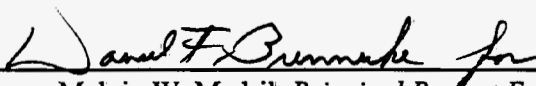
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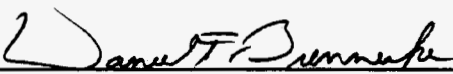
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<u>Sheet</u>	<u>Abridged Drawing No.</u>	<u>Title</u>
1	E04096	Title Sheet
2	E04097	Project Site Plan
3	E04098	Remediation Plan



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## 1.0 Introduction

This Removal Action Design for Lower Montezuma Creek was prepared for the U.S. Department of Energy (DOE), Grand Junction Office (GJO) in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA), Section 120, and Executive Order No. 12580. The U.S. Environmental Protection Agency (EPA), DOE, and the State of Utah entered into a Federal Facilities Agreement in December 1988 to complete remedial action at the Monticello Mill Tailings Site (MMTS) in Monticello, Utah. The Action Memorandum for Operable Unit (OU) III of MMTS (in progress) describes the removal action to be completed for Lower Montezuma Creek. OU III also includes contaminated surface water and groundwater, but remediation of those media are not included in this removal action. DOE, as the responsible party, must prepare the necessary documentation for planning, selecting, and implementing all remedial and removal actions for this area. This removal action meets all applicable or relevant and appropriate requirements (ARARs), which are evaluated in Appendix B. Section 5.1 discusses how this design complies with applicable ARARs. This design package is part of the removal action implementation.

## 2.0 Purpose

The purpose of this design package is to plan for implementation of the necessary action required to excavate approximately 109 cubic yards (yd<sup>3</sup>) of contaminated soil and sediment from the upper end of Lower Montezuma Creek, as described in the OU III Action Memorandum. This design package includes the radiological assessment, the recommended removal action, an evaluation of ARARs, the estimated volume of material to be removed, and the estimated cost of the proposed action at Lower Montezuma Creek.

The attached design drawings present a general description of the area and the work required on the property. The design is based on the removal action requirements discussed in this report, and the Radiological Assessment and ARARs presented in Appendices A and B, respectively. Removal action will be completed in conformance with the *Monticello General Construction Specifications* (Revised April 1997).

## 3.0 Property Descriptions

This removal action design package includes specifications for the removal of radiologically contaminated materials from environmentally sensitive areas in the Lower Montezuma Creek as shown on the drawings.

Lower Montezuma Creek includes DOE Property ID Nos. MG-01028-VL, MG-01029-VL, and MG-01030-VL; these properties total 553.8 acres, of which only a small portion within property MG-01029-VL will be disturbed by the removal action. The actual areas of disturbance will be less than 1 acre. The properties are located east of the city of Monticello, Utah, along the Monticello Creek drainage. The Monticello Creek drainage and canyon meander through the approximate center of the properties. OU III contaminated areas are defined by areas immediately adjacent to Montezuma Creek and lie within the confines of the canyon. Excavation activities resulting from this removal action will not impact the cultivated portions of the properties. However, 1.3 miles of existing agricultural land will be crossed by equipment using an existing farm-equipment access road shared by two separate landowners. This access to the canyon floor is from the north off of Highway 666. Approximately 0.10 mile of this road will require improvements to avoid any crop damage and/or impacts to farming

operations. Also, a portion of the access road on the north rim of the canyon will require maintenance such as dozing, blading, and widening to repair existing erosion, and to smooth grades.

The Lower Montezuma Creek area is environmentally sensitive because it contains wetlands, riparian, and upland vegetation, and may be used as pasture/grazing land by the property owners. All areas disturbed by contamination removal, including areas disturbed by the use of light-duty excavation equipment (i.e., single-axle dump trucks, skid-steer loaders, etc.), will be reclaimed after remediation is complete.

This design package addresses remediation of four deposits of contamination that exceed 80 microrentgens per hour ( $\mu\text{R/hr}$ ) of gamma-ray emissions. These deposits are located within DOE Property ID No. MG-01029-VL only. In order to minimize environmental impacts that a complete removal action would cause, DOE, EPA, and the State of Utah jointly developed the 80  $\mu\text{R/hr}$  action level and identified the four deposits (see deposits labeled A, B, C, and D in Figure 3-1 of Appendix A) addressed by this design package. The remaining material exceeding 40 CFR 192 standards will be included in a forthcoming supplemental standards application. Approximately 0.05 acre of riparian areas and 32 square feet of wetland areas will be affected by the removal action. Table 1 presents the total areas for each of the Lower Montezuma Creek properties and indicates the total estimated contaminated areas exceeding 40 CFR 192 standards, the contaminated areas and volumes exceeding the alternative action level of 80  $\mu\text{R/hr}$ , and volumes associated with contamination left in place and removed.

Table 1. Lower Montezuma Creek Quantities

Quantities	Total Properties	Property MG-01028-VL	Property MG-01029-VL	Property MG-01030-VL
Total Area (acres)	553.8	366	129.1	58.7
Contaminated Area in Excess of 40 CFR 192 ( $\text{ft}^2$ )	161,399 (3.7 acres)	3,199 (0.07 acres)	157,644 (3.6 acres)	556 (0.01 acre)
Contaminated Area in Excess of 80 $\mu\text{R/hr}$ ( $\text{ft}^2$ )	2,066 (0.05 acres)	0	2,066 (0.05 acres)	0
Contaminated Volume in Excess of 80 $\mu\text{R/hr}$ ( $\text{yd}^3$ )	91	0	91	0

Key:  $\text{ft}^2$  = square foot (feet)  
 $\mu\text{R/hr}$  = microrentgens per hour  
 $\text{yd}^3$  = cubic yard(s)

Note: Areas and volumes shown are based on radiological assessments.

The San Juan County Assessor's parcel number for MG-01028-VL is 34S24E041200 (B.520, P. 224, 225). The legal description is as follows:

The SW4, and the S2, NW4, and the SW4, NE4, and the W2, SE4, all in Section 4, 34S, 24E, Salt Lake Meridian, San Juan County, Utah.

The San Juan County Assessor's parcel number for MG-01029-VL is 34S24E040000 (B.720, P. 398, 399). The legal description is as follows:

Lots 1 and 2, and the SE4, NE4 of Section 4, 34S, 24E, Salt Lake Meridian, San Juan County, Utah.

The San Juan County Assessor's parcel number for MG-01030-VL is 34S24E047200 (B.739, P. 498). The legal description is as follows:

Beginning at the E4 corner of Section 4, 34S, 24E, Salt Lake Meridian, San Juan County, Utah; thence west, 1,320 feet; thence south, 2,640 feet; thence east, to the east rim of Vega Canyon (aka Montezuma Canyon); thence northeasterly, along the rim of Vega Canyon, to a point which is 330 feet south of said E4 corner of Section 4; thence north, 330 feet to the point of beginning.

### 3.1 Removal Action Cleanup Levels

A complete radiological assessment was performed on the three properties to determine the extent of contamination exceeding the 40 CFR 192 cleanup standards (see *MMTS, Operable Unit III, Remedial Investigation*, DOE 1997). After a thorough Baseline Risk Assessment was performed (see *Alternatives Analysis Report*, DOE 1997, for a summary), a risk management decision by DOE, EPA, and the State of Utah established an 80  $\mu\text{R/hr}$  action level for Lower Montezuma Creek. Further field investigations by DOE, EPA, and the State of Utah identified four specific areas for remediation. Restricting excavation to the four areas identified makes use of "As Low As Reasonably Achievable" (ALARA) guidance by reducing human health risk from  $9.2 \times 10^{-6}$  to  $8.6 \times 10^{-6}$  added cancer risk. The areal locations of these 80  $\mu\text{R/hr}$  zones were located using field gamma scintillometers to identify the boundary of each contaminated area. These areas were subsequently surveyed for use in field and design drawing layout.

This removal action will remove contaminated soil and sediment with surface gamma exposure rates that exceed 80  $\mu\text{R/hr}$  (approximately 57 picocuries per gram [pCi/g] radium-226 [Ra-226]) from four areas in the upper end of Lower Montezuma Creek and will apply institutional controls in the form of a restrictive easement. The restrictive easement will not allow residential development within the contaminated areas. Excavation within the four areas identified for remediation will continue at depth until the concentration of Ra-226 is less than 15 pCi/g above background or until excavation intersects the water table. Excavation will stop at the water table even if the soil and sediments have Ra-226 concentrations that exceed 15 pCi/g above background.

This removal action complies with all ARARs. Compliance with 40 CFR 192 in the areas not remediated to the 5 and 15 pCi/g Ra-226 standard (all areas of Lower Montezuma Creek) will be accomplished by applying supplemental standards. Application of supplemental standards is based on the criterion in 40 CFR 192.21(b): remediation to 5/15 pCi/g Ra-226 in Lower Montezuma Creek would cause environmental harm that is excessive compared to the health benefits of remediation. The supplemental standards application will include the requirement for long-term surveillance and maintenance and 5-year reviews.

## 4.0 Property Owner Concerns

The three Lower Montezuma Creek properties are owned by the same person. Haul routes and equipment access must be coordinated with the property owners to minimize impacts to farming operations.

## 5.0 Design Considerations

All deposits requiring removal are located on the north side of the creek, therefore an existing dirt road on the north side of the canyon will be used for access to the site. Only single-axle dump trucks with a maximum truck capacity of 6 cubic yards will be used. These trucks will only be allowed to drive to a single designated loading area at the bottom of the canyon. All material will be hauled to the loading area using equipment no larger than a "Case 1845-C" skid steer loader. Haulage routes will be designated, and no disturbance beyond these routes or the excavation areas will be allowed.

Because all excavation is outside of the creek channel, there will be no disturbance to the creek banks and to creek flows. All wetlands will be reestablished, and riparian areas revegetated.

### 5.1 ARAR Compliance

Appendix B presents an evaluation of ARARs for this removal action. The following describes how this design complies with ARARs for the Lower Montezuma Creek excavation.

#### *Uranium Mill Tailings Radiation Control Act*

Compliance with 40 CFR 192 will be achieved by application of supplemental standards based on the criterion in 40 CFR 192.21(b): remediation to 5/15 pCi/g Ra-226 in Lower Montezuma Creek would cause environmental harm that is excessive compared to the health benefits of remediation.

#### *Archaeological and Historical Preservation Act*

A recent archaeological survey identified that the removal action will have no impact on any known archaeological site.

#### *Fish and Wildlife Coordination Act*

DOE has prepared a *Biological Assessment of Monticello Mill Tailings Site Remedial Activities* (draft, January 1998) and has requested a formal consultation with the U.S. Fish and Wildlife Service (USFWS). This removal action is based on an alternate action level that significantly reduces the amount of area requiring disturbance. In addition, access to the contamination deposits is restricted to designated routes, which are located to minimize damage. The reclamation plan requires revegetation of riparian areas as well as reestablishment of wetland areas.

#### *Endangered Species Act*

DOE has prepared the *Biological Assessment of Monticello Mill Tailings Site Remedial Activities* (draft, January 1998), which discusses the effects of OU III activities on threatened and endangered species, and has submitted this document to the USFWS for a biological opinion. Because this removal action is limited to four designated deposits, no creek disturbance will occur.

#### *Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands)*

This removal action is based on an alternate action level that significantly reduces the amount of area requiring disturbance. In addition, access to the contamination deposits is restricted to designated routes, which are located to minimize damage. The reclamation plan requires revegetation of riparian areas as well as reestablishment of wetland areas.



### ***Utah Pollutant Discharge Elimination System (UPDES)***

All storm-water runoff will be mitigated using controls such as silt fences, ditches, and berms as identified in the Monticello General Construction Specifications.

### ***National Environmental Policy Act***

In compliance with the National Environmental Policy Act (NEPA) requirements, environmental impacts associated with this removal action were evaluated in the Remedial Investigation (DOE 1998) and Alternative Analysis (DOE 1998) reports. These reports provide environmental information concerning soil and sediment cleanup in OU III, evaluate each of the proposed alternatives, and identify the selected remedy. This design was selected as a result of the alternative analysis.

### ***Dredge or Fill Requirements (Section 404)***

This removal action is based on an alternate action level that significantly reduces the area requiring disturbance, which reduces the amount of potential water quality impacts. Because of this, no creek disturbance is required.

### ***Air Quality***

The Monticello General Construction Specifications are to be used for this project. These specifications require that measures shall be implemented to eliminate any visible dust. Dust control may be implemented through the use of dust suppressants, including water.

### ***Corrective Action Cleanup Standards Policy for CERCLA and Underground Storage Tank Sites***

Implementation of this removal action is based on a CERCLA risk assessment and meets all ARARs, which constitutes compliance with this requirement.

### ***Radiation Control***

Regulations stated in 29 CFR 1910 and 29 CFR 1926 regarding removal of uranium mill tailings will be enforced during this removal action. In addition, U.S. Department of Transportation regulations governing the transportation of hazardous materials will be enforced.

## **6.0 Quantities/Cost Estimate**

Past experience on similar projects has shown that actual excavated contaminated materials can exceed the radiologically assessed quantities by an average of 70 percent. This increase has been largely due to chasing contamination laterally from previously identified surface contamination. Anticipated additional quantities for this design (20 percent) are significantly less than the average increase as a result of the negotiated cleanup design, which calls for vertically excavating below the specified 80  $\mu$ R/hr areas with no lateral chasing of contamination. However, it is expected that there will be small variations in the actual depth of contamination encountered during remediation compared to the depths assessed during the field investigation and data interpretation. The difference between actual depth and assessed depths results in additional volume (quantities) of contaminated material being removed during excavation.

Table 2 summarizes the quantities of material that are expected to be excavated during implementation of this design package. The total estimated volume of contaminated material to be removed from the property as a result of the removal action is 109 yd<sup>3</sup> (175 tons).

*Table 2. Area/Volume Summary—Lower Montezuma Creek*

<b><u>Assessed Quantities (80 <math>\mu</math>R/hr):</u></b>			
Contaminated	91 yd <sup>3</sup>	146 tons	2,066 ft <sup>2</sup>
Uncontaminated	0 yd <sup>3</sup>	0 tons	0 ft <sup>2</sup>
Total	91 yd <sup>3</sup>	146 tons	2,066 ft <sup>2</sup>
<b><u>Anticipated Additional Quantities:</u></b>			
Contaminated	18 yd <sup>3</sup>	29 tons	
Uncontaminated	0 yd <sup>3</sup>	0 tons	
Subtotals:	18 yd <sup>3</sup>	29 tons	
<b><u>Project Totals:</u></b>			
	109 yd <sup>3</sup>	175 tons	
Key: ft <sup>2</sup> = square foot (feet)			
yd <sup>3</sup> = cubic yard(s)			

Table 3 summarizes the cost estimate for implementation of this design which presents radiologically assessed quantities that exceed 80  $\mu$ R/hr as well as anticipated additional quantities. The total estimated project cost is \$17,000.

Table 3. Construction Cost Estimate

NO.	OPERATION	INITIAL QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL COST
1.	Mobilization/Demobilization	1.0	LS	\$ 6,317.60	6,318
2.	Machine/Hand Excavation—Contaminated	91	yd <sup>3</sup>	20.16	1,835
3.	Topsoil Backfill	91	yd <sup>3</sup>	10.32	939
4.	North Access Road Improvements	1.0	LS	5,557.00	5,557
5.	Remove/Reinstall/Repair Gate	1.0	LS	512.00	512
6.	Surface Runoff Control	100.0	yd <sup>3</sup>	2.94	294
7.	Revegetation—Upland/Riparian/Wetland	1	LS	884.00	884
SUBTOTAL:					16,339
<u>Anticipated Additional Quantities</u>					
8.	Machine Excavation/Hand—Contaminated	18	yd <sup>3</sup>	20.16	363
9.	Topsoil Backfill	18	yd <sup>3</sup>	10.00	180
SUBTOTAL:					543
TOTAL:					\$16,882
TOTAL ESTIMATED PROJECT COST:					\$17,000

Key: LS = lump sum  
 yd<sup>2</sup> = square yard(s)  
 yd<sup>3</sup> = cubic yard(s)

## 7.0 Removal Action Verification

Due to the environmentally sensitive nature of the Lower Montezuma Creek area, excavation will progress vertically in each contaminated deposit area until verification indicates that 40 CFR 192 cleanup standards have been achieved or until groundwater is encountered. Contaminated material will not be chased laterally for any deposit and no dewatering will take place. Upon completion of the removal action, standard verification procedures, in accordance with Section 3.7.3, "Standard Verification Method," of the *Field Services Procedures Manual* (Manual MAC-3000), will be used to verify that cleanup standards have been met.

If groundwater is encountered prior to achieving the cleanup standards for a given deposit, removal action will stop at that deposit. Gamma exposure rates, area measurements, and Ra-226 concentration rates will be gathered and recorded on the Radiological Checklist for Application of Supplemental Standards. This information will document tailings contamination left in place.



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## **Appendix A**

### **Radiological Assessment**

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## A.1.0 Introduction

This radiological assessment report involves three properties that comprise the Lower Montezuma Creek area of Monticello Remedial Action project Operable Unit (OU) III. These properties are DOE ID Numbers MG-01028-VL (County Plat Number 34S24E041200), MG-01029-VL (County Plat Number 34S24E040000), and MG-01030-VL (County Plat Number 34S24E047200) and are located near the confluence of Vega Creek and Montezuma Creek. These properties are owned by Mr. and Mrs. John Johnson and are primarily used for agricultural purposes (dry-land wheat farming and grazing). The portion of the land through which Montezuma Creek flows is bounded by steep-sided canyon walls.

Radiological data were collected during the period from 1994 through 1996 following procedures described in the

- draft *Monticello Mill Tailings Site, Operable Unit III, Remedial Investigation/Feasibility Study, Field Sampling Plan* (July 1994, March 1995);
- *Monticello Mill Tailings Site, Operable Unit III, Focused Work Plan for Confirmatory Soil Sampling* (DOE 1994);
- draft final *Monticello Mill Tailings Site, Operable Unit III, Remedial Investigation/Feasibility Study, Field Sampling Plan* (September 1995); and the
- *Monticello Mill Tailings Site, Operable Unit III, Sampling and Analysis Plan for Additional Characterization of Middle and Lower Montezuma Creek* (April 1996),

These data were evaluated to estimate the extent of contamination from residual radioactive material in excess of the U.S. Environmental Protection Agency (EPA) "Standards for Remedial Action at Inactive Uranium Processing Sites" (40 CFR Part 192) and are presented in this assessment.

The measurement techniques, instrumentation, and procedures used in this radiological assessment are primarily based on protocols developed by the U.S. Department of Energy (DOE) Office of Remedial Action and Waste Technology Technical Measurements Center, and on field implementation experience gained from the characterization of millsites and vicinity properties for the Uranium Mill Tailings Remedial Action (UMTRA) Program. Detailed procedures for collecting soil samples and measurements are presented in the MACTEC-ERS *Field Services Procedures Manual*. Detailed analytical procedures are presented in the following WASTREN-GJ Grand Junction Office (GJO) Analytical Laboratory manuals: *Administrative Plan and Quality Control Methods for Analytical Laboratories*, and the *Handbook of Analytical and Sample Preparation Methods*, Volumes I through IV.

## A.2.0 Background Gamma Exposure Rate and Radium Determinations

The background gamma exposure rate and radium-226 (Ra-226) concentration for the MMTS OU III properties were determined during the radiological characterization conducted by Bendix Field Engineering in 1984. This study concluded that the average background gamma exposure rate measurement is 15  $\mu\text{R/hr}$ , and the background Ra-226 concentration is 1.0 picoCurie per gram (pCi/g).

### A.3.0 Gamma Exposure Rate Survey

A ground-level gamma exposure rate survey was completed in April 1994 within the boundary of OU III. Contour intervals selected for the surveys were 18  $\mu\text{R/hr}$ , 24  $\mu\text{R/hr}$ , and 97  $\mu\text{R/hr}$ .

Gamma exposure rate measurements were collected with Mount Sopris (Model SC-132) scintillation detectors. These instruments measure gross gamma in counts per second and are cross-correlated with a pressurized ionization chamber to determine the correction factors used to convert the raw data to true gamma exposure rates.

In certain areas of interest on the properties, additional gamma exposure rate readings at ground level and waist level were collected during 1996. These additional readings were required to adequately characterize the area.

Ground-level gamma exposure rates measured on these properties ranged from 11  $\mu\text{R/hr}$  to 96  $\mu\text{R/hr}$ . Figure 3-1, Sheets 1 and 2, are gamma exposure rate contour maps generated with the discrete ground-level readings collected during the 1994 and 1996 surveys.

### A.4.0 Radon/Radon Decay-Product Concentration (RDC) Measurements

EPA RDC guidelines are not applicable, since no structures exist on these properties.

### A.5.0 In-Situ Radium Measurements and Soil Samples

Figure 5-1, Sheets 1 and 2 show the locations of measurements made; the related radium data are presented in Tables 5-1 and 5-2. Ra-226 concentrations, as determined by the methods used in these characterizations, range from 1.0 pCi/g to 142.0 pCi/g. Delta-gamma scintillometers, borehole logging, and soil sampling were the methods used to characterize these properties.

#### A.5.1 Delta-Gamma Measurements

BFEC (Model EL-0018A) delta-gamma scintillometers were used to estimate the in-situ Ra-226 concentrations, and to differentiate between areas of secondary gamma radiation (shine) and areas of contamination. These instruments measure the difference in count rate between shielded and unshielded readings at a discrete sample location. The readings were reduced to pCi/g equivalent Ra-226 by applying conversion factors determined during calibration.

#### A.5.2 Borehole Logging

Boreholes were drilled and logged in overbank areas with elevated surface contamination, depositional areas, and areas determined by the regulators to be of interest, to determine the depth of contamination present. Boreholes also were drilled and logged in areas with no surface contamination to confirm the lack of contamination at depth. All holes were drilled with a portable gasoline-powered auger or all terrain vehicle-mounted auger, both using bits measuring 4-1/2 inches in diameter. Eberline (Models PRS-1 and ESP-1) scalers equipped with Model SPA-3 gamma-scintillation detectors were used to log the holes in 6-inch-depth intervals. The gamma counts were accumulated for 30 seconds at each interval. These readings were reduced to pCi/g equivalent Ra-226 by applying conversion factors determined during calibration.

Total-count logging was also employed with the use of the Geoprobe Hydraulic Hammer-Drill (Geoprobe). The Geoprobe is a vehicle-mounted, hydraulically operated hammer-drill capable of pressing hollow rods into the ground. Eberline (Model ESP-1) scalers equipped with Bicon Model 162000 pipe monitor gamma ray detectors were used to log the holes in 5-inch-depth intervals. The gamma counts were accumulated for 60 seconds at each interval through the hollow rods. These readings were reduced to pCi/g equivalent Ra-226 by applying conversion and attenuation factors determined during calibration.

### A.5.3 Soil Samples

Ninety-two soil samples were collected and submitted to the GJO Analytical Laboratory for Ra-226 activity by gamma spectrometry analysis. For prompt radium concentration determinations, four soil samples were analyzed by the Opposed Crystal System.

## A.6.0 Estimated Extent of Contamination

All radiological data available for these properties were reviewed and evaluated according to guidelines described in the MACTEC-ERS *Field Services Procedures Manual* (MAC-3000). The results of this evaluation indicate that Ra-226 contamination is present in discontinuous, elongated deposits adjacent to Montezuma Creek. The depth of Ra-226 contamination is generally less than 24 inches, but does extend to 36 inches, and more than 60 percent of the Ra-226 contamination (by volume) is in the top 6 inches of soil. Ra-226 contamination at depths greater than 24 inches is present on property MG-01029-VL near the confluence of the North Creek Diversion and Montezuma Creek, where the floodplain opens up and becomes topographically flat and wide. In this area, contaminated soils are present as a result of overbank deposition during flood events on Montezuma Creek.

Figure 6-1 is an isopleth map showing the estimated boundaries and depths of contamination determined for each 6-inch-thick soil layer for the first 12 inches. Contamination deposits deeper than 12 inches are contoured in 12-inch-thick intervals. Tables 5-1 and 5-2 show the sample locations, Ra-226 results, and gamma exposure rates for each location.

## A.7.0 Alternative Clean-Up Recommendations

Remove contamination in deposits that display surface gamma exposure rates exceeding 80  $\mu$ R/hr to below 40 CFR 192 standards or to groundwater.

These properties contain deposits of uranium mill tailings that exceed 130.0 pCi/g of Ra-226. U.S. Department of Transportation (DOT) requirements for transporting radioactive material (RAM) when Part 'B' properties are defined by field assessment must be followed during the removal action. These requirements include two options: (1) transport the material in placarded trucks under DOT Exemption E-10594, or (2) blend with other material (RAM) to produce an average concentration that is less than the cutoff activity (see *Field Services Procedures Manual* [MAC-3000]).

Standard verification procedures may be used for these properties.

## A.8.0 Commingled Waste Investigation

Commingled (suspect hazardous material mixed with radioactive material) waste investigations were not performed on these properties.

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Table 5-1. 1996 Soil Field Radiological Measurements—Operable Unit III

Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h	Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h
Downgradient - Lower Montezuma Creek						Downgradient - Lower Montezuma Creek					
R40-96	0	TC	23.5	81	55	R46-96	0	TC	10.4	38	34
R40-96	0	DS	69.6			R46-96	0	DS	22.0		
R40-96	6	TC	43.4			R46-96	6	TC	19.5		
R40-96	12	TC	64.1			R46-96	12	TC	14.6		
R40-96	18	TC	107.2			R46-96	18	TC	5.6		
R40-96	24	TC	71.0			R46-96	24	TC	4.8		
R40-96	30	TC	14.4			R46-96	30	TC	3.9		
R41-96	0	TC	2.4	14	14	R47-96	0	TC	2.4	15	15
R41-96	0	DS	<1.0			R47-96	0	DS	<1.0		
R41-96	6	TC	3.1			R47-96	6	TC	3.0		
R41-96	12	TC	3.4			R47-96	12	TC	3.3		
R41-96	18	TC	3.3			R47-96	18	TC	3.3		
R41-96	24	TC	3.2			R47-96	24	TC	3.3		
R41-96	30	TC	3.1			R47-96	30	TC	3.3		
R42-96	0	TC	26.9	81	58	R48-96	0	TC	2.2	17	17
R42-96	0	DS	69.0			R48-96	0	DS	1.6		
R42-96	6	TC	27.5			R48-96	6	TC	3.9		
R42-96	12	TC	10.6			R48-96	12	TC	4.4		
R42-96	18	TC	13.5			R48-96	18	TC	4.4		
R42-96	24	TC	15.9			R48-96	24	TC	4.8		
R42-96	30	TC	9.6			R48-96	30	TC	4.2		
R42-96	36	TC	7.6			R48-96	36	TC	3.8		
R43-96	0	TC	24.5	77	44	R48-96	42	TC	2.7		
R43-96	0	DS	53.4			R48-96	48	TC	1.9		
R43-96	6	TC	47.0			R48-96	54	TC	2.2		
R43-96	12	TC	39.1			R48-96	60	TC	3.1		
R43-96	18	TC	13.4			R48-96	66	TC	2.3		
R43-96	24	TC	5.9			R49-96	0	TC	16.9	58	47
R43-96	30	TC	5.6			R49-96	0	DS	37.4		
R43-96	36	TC	6.3			R49-96	6	TC	32.1		
R44-96	0	TC	24.1	96	81	R49-96	12	TC	42.9		
R44-96	0	DS	78.5			R49-96	18	TC	66.8		
R44-96	6	TC	54.9			R49-96	24	TC	15.5		
R44-96	12	TC	102.5			R49-96	30	TC	4.2		
R44-96	18	TC	54.8			R49-96	36	TC	6.6		
R44-96	24	TC	5.3			R50-96	0	TC	5.9	32	32
R44-96	30	TC	4.4			R50-96	0	DS	17.8		
R44-96	36	TC	4.0			R50-96	6	TC	15.8		
R45-96	0	TC	2.5	16	16	R50-96	12	TC	18.2		
R45-96	0	DS	1.2			R50-96	18	TC	29.3		
R45-96	6	TC	3.1			R50-96	24	TC	45.1		
R45-96	12	TC	3.4			R50-96	30	TC	107.1		
R45-96	18	TC	3.3			R50-96	36	TC	27.8		
						R50-96	42	TC	4.8		
						R50-96	48	TC	3.5		

<sup>a</sup>Radium-226 field measurement types: DS = Delta Scintillometer, OC = Soil Sample by Opp. Crys. Sys., TC = Total Count Borehole



Table 5-1 (continued). 1996 Soil Field Radiological Measurements—Operable Unit III

Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h	Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h
Downgradient - Lower Montezuma Creek						Downgradient - Lower Montezuma Creek					
R45-96	24	TC	3.3			R50-96	54	TC	2.2		
						R50-96	60	TC	2.8		
						R50-96	66	TC	2.5		
R51-96	0	TC	2.4	15	15	R57-96	6	TC	18.6		
R51-96	0	DS	<1.0			R57-96	12	TC	24.6		
R51-96	6	TC	3.1			R57-96	18	TC	76.8		
R51-96	12	TC	3.5			R57-96	24	TC	90.4		
R51-96	18	TC	3.6			R57-96	30	TC	8.3		
R51-96	24	TC	3.9			R57-96	36	TC	2.1		
R51-96	30	TC	3.7			R57-96	42	TC	3.0		
R51-96	36	TC	3.6								
						R58-96	0	TC	2.6	19	18
R52-96	0	TC	2.5	14	15	R58-96	0-6	OC	4.6		
R52-96	0	DS	<1.0			R58-96	0	DS	3.8		
R52-96	6	TC	3.0			R58-96	6	TC	4.4		
R52-96	12	TC	3.1			R58-96	12	TC	5.1		
R52-96	18	TC	3.2			R58-96	18	TC	5.1		
R52-96	24	TC	3.2			R58-96	24	TC	9.2		
R52-96	30	TC	3.3			R58-96	30	TC	5.7		
						R58-96	36	TC	1.9		
R53-96	0	TC	4.6	21	18	R58-96	42	TC	1.6		
R53-96	0	DS	6.7								
R53-96	6	TC	6.1			R59-96	0	TC	11.8	40	32
R53-96	12	TC	3.7			R59-96	0	DS	20.8		
R53-96	18	TC	3.5			R59-96	6	TC	31.8		
R53-96	24	TC	3.7			R59-96	12	TC	19.0		
R53-96	30	TC	3.6			R59-96	18	TC	4.7		
						R59-96	24	TC	4.3		
R54-96	0	TC	2.5	16	16						
R54-96	0	DS	1.2			R60-96	0	TC	2.5	15	15
R54-96	6	TC	3.3			R60-96	0	DS	<1.0		
R54-96	12	TC	2.8			R60-96	6	TC	3.2		
R54-96	18	TC	3.1			R60-96	12	TC	3.6		
R54-96	24	TC	2.9			R60-96	18	TC	3.7		
R54-96	30	TC	2.9			R60-96	24	TC	3.5		
R55-96	0	TC	6.2	32	27	R61-96	0	TC	1.7	14	14
R55-96	0	DS	17.8			R61-96	0	DS	1.1		
R55-96	6	TC	11.7			R61-96	6	TC	2.7		
R55-96	12	TC	24.5			R61-96	12	TC	2.4		
R55-96	18	TC	58.7			R61-96	18	TC	2.1		
R55-96	24	TC	37.4			R61-96	24	TC	2.2		
R55-96	30	TC	8.4			R61-96	30	TC	2.2		
R56-96	0	TC	1.4	14	14	R62-96	0	TC	17.9	55	44
R56-96	0	DS	<1.0			R62-96	0	DS	38.9		
R56-96	6	TC	2.3			R62-96	6	TC	34.2		
R56-96	12	TC	2.6			R62-96	12	TC	60.4		
R56-96	18	TC	2.4			R62-96	18	TC	83.0		

<sup>a</sup>Radium-226 field measurement types: DS = Delta Scintillometer, OC = Soil Sample by Opp. Crys. Sys., TC = Total Count Borehole

Table 5-1 (continued). 1996 Soil Field Radiological Measurements—Operable Unit III

Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h	Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h
Downgradient - Lower Montezuma Creek						Downgradient - Lower Montezuma Creek					
R56-96	24	TC	2.3			R62-96	24	TC	14.6		
R56-96	30	TC	2.2								
R57-96	0	TC	5.9	27	27	R63-96	0	TC	2.1	14	14
R57-96	0	DS	15.8			R63-96	0	DS	<1.0		
R63-96	12	TC	2.8			R63-96	6	TC	2.8		
R63-96	18	TC	2.6			R69-96	24	TC	20.5		
R63-96	24	TC	2.6			R69-96	30	TC	5.2		
R63-96	30	TC	2.8			R69-96	36	TC	5.3		
R63-96	36	TC	2.6								
R64-96	0	TC	9.5	40	32	R70-96	0	TC	12.1	25	25
R64-96	0	DS	26.0			R70-96	0	DS	7.0		
R64-96	6	TC	29.0			R70-96	6	TC	14.6		
R64-96	12	TC	7.9			R70-96	12	TC	62.7		
R64-96	18	TC	2.6			R70-96	18	TC	55.8		
R64-96	24	TC	2.7			R70-96	24	TC	9.0		
R64-96	30	TC	2.6			R70-96	30	TC	5.8		
R65-96	0	TC	6.7	29	21	R71-96	0	TC	7.5	29	29
R65-96	0	DS	14.4			R71-96	0	DS	12.5		
R65-96	6	TC	11.0			R71-96	6	TC	14.6		
R65-96	12	TC	52.1			R71-96	12	TC	31.8		
R65-96	18	TC	29.1			R71-96	18	TC	12.3		
R65-96	24	TC	7.3			R71-96	24	TC	5.5		
R65-96	30	TC	6.7			R71-96	30	TC	3.4		
R66-96	0	TC	1.9	14	15	R72-96	0	TC	3.5	16	17
R66-96	0	DS	<1.0			R72-96	0-6	OC	3.5		
R66-96	6	TC	2.5			R72-96	0	DS	2.2		
R66-96	12	TC	2.6			R72-96	6	TC	4.0		
R66-96	18	TC	2.1			R72-96	12	TC	5.0		
R66-96	24	TC	2.2			R72-96	18	TC	5.3		
R67-96	0	TC	7.5	32	23	R72-96	24	TC	5.0		
R67-96	0	DS	15.8			R72-96	30	TC	5.5		
R67-96	6	TC	16.6			R72-96	36	TC	4.3		
R67-96	12	TC	31.9								
R67-96	18	TC	15.7			R73-96	0	TC	2.3	14	14
R67-96	24	TC	3.8			R73-96	0	DS	1.2		
R67-96	30	TC	5.1			R73-96	6	TC	3.1		
R68-96	0	TC	2.1	12	12	R73-96	12	TC	3.6		
R68-96	0	DS	<1.0			R73-96	18	TC	3.8		
R68-96	6	TC	3.3			R73-96	24	TC	3.6		
R68-96	12	TC	3.3			R73-96	30	TC	3.6		
R68-96	18	TC	3.1								
R68-96	24	TC	3.0			R74-96	0	TC	19.6	96	58
R68-96	30	TC	3.0			R74-96	0	DS	70.5		
						R74-96	6	TC	38.1		
						R74-96	12	TC	2.6		
						R74-96	18	TC	3.4		
						R74-96	24	TC	2.9		

<sup>a</sup>Radium-226 field measurement types: DS = Delta Scintillometer, OC = Soil Sample by Opp. Crys. Sys., TC = Total Count Borehole

Table 5-1 (continued). 1996 Soil Field Radiological Measurements—Operable Unit III

Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h	Sample Loc.	Depth inches	Ra226 Meas. Type <sup>a</sup>	Ra226 pCi/g	Ground Gamma $\mu$ R/h	Waist Gamma $\mu$ R/h
Downgradient - Lower Montezuma Creek						Downgradient - Lower Montezuma Creek					
R68-96	36	TC	2.9			R74-96	30	TC	2.7		
R69-96	0	TC	11.3	34	23	R75-96	0	TC	3.0	16	15
R69-96	0	DS	19.0			R75-96	0-6	OC	3.4		
R69-96	6	TC	18.7			R75-96	0	DS	2.6		
R69-96	12	TC	58.8			R75-96	6	TC	4.9		
R69-96	18	TC	93.8			R75-96	12	TC	7.6		
R75-96	18	TC	5.9			R81-96	24	TC	3.0		
R75-96	24	TC	2.7								
R75-96	30	TC	2.7			R82-96	0	TC	11.0	40	27
						R82-96	0	DS	22.7		
R76-96	0	TC	6.6	21	18	R82-96	6	TC	25.6		
R76-96	0	DS	11.2			R82-96	12	TC	54.6		
R76-96	6	TC	17.9			R82-96	18	TC	14.5		
R76-96	12	TC	28.3			R82-96	24	TC	4.2		
R76-96	18	TC	4.5			R82-96	30	TC	3.7		
R76-96	24	TC	3.3								
R76-96	30	TC	3.4			R83-96	0	TC	2.3	14	14
						R83-96	0	DS	1.0		
R77-96	0	TC	2.3	14	14	R83-96	6	TC	3.1		
R77-96	0	DS	1.9			R83-96	12	TC	3.2		
R77-96	6	TC	4.0			R83-96	18	TC	3.1		
R77-96	12	TC	4.8			R83-96	24	TC	3.1		
R77-96	18	TC	4.4			R83-96	30	TC	3.1		
R77-96	24	TC	5.0			R83-96	36	TC	3.1		
R77-96	30	TC	4.4								
R78-96	0	TC	2.5	14	14	R84-96	0	TC	8.0	58	40
R78-96	0	DS	<1.0			R84-96	0	DS	30.9		
R78-96	6	TC	3.9			R84-96	6	TC	9.4		
R78-96	12	TC	3.9			R84-96	12	TC	4.1		
R78-96	18	TC	6.5			R84-96	18	TC	3.2		
R78-96	24	TC	8.2			R84-96	24	TC	3.6		
R78-96	30	TC	6.8			R84-96	30	TC	3.5		
R78-96	36	TC	6.2								
R79-96	0	TC	13.9	55	44	R85-96	0	TC	2.0	14	14
R79-96	0	DS	43.4			R85-96	0	DS	<1.0		
R79-96	6	TC	46.2			R85-96	6	TC	2.2		
R79-96	12	TC	26.3			R85-96	12	TC	1.9		
R79-96	18	TC	2.1			R85-96	18	TC	2.2		
R79-96	24	TC	2.7			R85-96	24	TC	1.9		
R79-96	30	TC	2.4			R85-96	30	TC	1.8		
R80-96	0	TC	2.1	15	15	R86-96	0	TC	7.1	29	25
R80-96	0-6	OC	2.2			R86-96	0	DS	12.7		
R80-96	0	DS	2.0			R86-96	6	TC	10.1		
R80-96	6	TC	3.8			R86-96	12	TC	3.7		
R80-96	12	TC	4.6			R86-96	18	TC	2.7		
						R86-96	24	TC	3.0		

<sup>a</sup>Radium-226 field measurement types: DS = Delta Scintillometer, OC = Soil Sample by Opp. Crys. Sys., TC = Total Count Borehole

Table 5-1 (continued). 1996 Soil Field Radiological Measurements—Operable Unit III

			$\mu$	$\mu$	
R80-96	18	TC	4.2		
R80-96	24	TC	4.6		
R80-96	30	TC	3.7		
R81-96	0	TC	7.2	32	25
R81-96	0	DS	12.0		
R81-96	6	TC	13.3		
R81-96	12	TC	4.7		
R81-96	18	TC	2.9		
R87-96	48	TC	9.6		
R87-96	0	TC	1.9	15	14
R87-96	0	DS	1.7		
R87-96	6	TC	3.6		
R87-96	12	TC	3.7		
R87-96	18	TC	16.3		
R87-96	24	TC	26.8		
R87-96	30	TC	19.4		
R87-96	36	TC	12.2		
R87-96	42	TC	10.8		
R88-96	0	TC	1.9	14	14
R88-96	0	DS	1.3		
R88-96	6	TC	3.5		
R88-96	12	TC	4.8		
R88-96	18	TC	5.9		
R88-96	24	TC	6.5		
R88-96	30	TC	4.1		
R88-96	36	TC	3.5		
R89-96	0	TC	1.9	14	14
R89-96	0	DS	<1.0		
R89-96	6	TC	2.8		
R89-96	12	TC	4.4		
R89-96	18	TC	4.8		
R89-96	24	TC	3.7		
R89-96	30	TC	4.9		
R89-96	36	TC	6.2		
R90-96	0	TC	2.0	14	14
R90-96	0	DS	1.2		
R90-96	6	TC	3.2		
R90-96	12	TC	4.0		
R90-96	18	TC	3.3		
R90-96	24	TC	2.9		
R90-96	30	TC	2.4		
R91-96	0	TC	2.3		
R91-96	0	DS	<1.0		
R91-96	6	TC	2.8		
R91-96	12	TC	3.0		
R91-96	18	TC	2.9		
R91-96	24	TC	2.9		
R91-96	30	TC	2.9		

<sup>a</sup>Radium-226 field measurement types: DS = Delta Scintillometer, OC = Soil Sample by Opp. Crys. Sys., TC = Total Count Borehole

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Table 5-2. Soil and Sediment Radionuclide Data<sup>a</sup>

Sample Location <sup>b</sup>	Sample Date	Sample Type	Pb210 (pCi/g)	Ra226 (pCi/g)	Th230 (pCi/g)	U (mg/kg)	U234 (pCi/g)	U235 (pCi/g)	U238 (pCi/g)
Downgradient - Lower Montezuma Creek									
HH19-96 0-3"	05/30/1996	Soil	7.5	8.1	9.5	10.7	6.2	0.34	3.6
HH1921-96 0-3"	05/30/1996	Soil	10.3	13.2	15.3	22.3	7.5	0.36	7.41.3
HH21-96 0-3"	05/30/1996	Soil	1.8	1.9	2.0	3.4	1.0	0.08	1.3
HH22-96 0-3"	05/30/1996	Soil	2.6	3.8	3.1	4.6	1.6	0.09	1.8
HH23-96 0-3"	05/30/1996	Soil	9.2	11.6	15.5	13.6	4.8	0.32	4.7
HH24-96 0-3"	05/30/1996	Soil	2.2	1.2	15.0	2.8	10.4	0.51	10.7
HH25-96 0-3"	05/30/1996	Soil	10.7	11.8	1.6	32.7	0.85	0.07U	0.83
HH26-96 0-3"	05/30/1996	Soil	1.6	1.4	1.3	2.8	0.87	0.09U	0.91
R40-96 0-3"	05/31/1996	Soil	35.6	43.5	54.0	34.9	11.8	0.75	11.7
R41-96 0-3"	05/31/1996	Soil	1.6	1.6	2.0	3.6	1.2	0.08	1.1
R41-96 3-9"	06/03/1996	Soil	1.3U	1.0	1.5	3.4	1.1	0.06	1.2
R42-96 0-3"	05/31/1996	Soil	64.6	85.2	102	66.6	22.1	1.5	22.3
R42-96 3-9"	06/03/1996	Soil	6.5	6.3	9.2	12.0	3.8	0.16	4.2
R43-96 0-3"	05/31/1996	Soil	44.5	58.2	75.6	37.0	12.9	0.62	12.1
R43-96 0-3" (Dup)	05/31/1996	Soil	44.6	52.0	73.5	37.5	12.3	0.67	12.2
R44-96 0-3"	05/31/1996	Soil	24.5	37.5	32.0	42.2	13.6	0.82	14.0
R44-96 9-15"	05/31/1996	Soil	91.2	107	131	70.3	24.0	1.0	23.8
R45-96 0-3"	05/31/1996	Soil	2.4	1.7	2.1	3.5	1.1	0.07U	1.2
R46-96 0-3"	05/30/1996	Soil	19.9	23.6	31.7	31.1	10.1	0.38	11.2
R47-96 0-3"	05/30/1996	Soil	1.3U	1.4	1.3	3.0	1.2	0.06U	1.1
R48-96 0-3"	05/30/1996	Soil	3.2	3.5	4.4	7.1	2.2	0.12	2.5
R49-96 0-3"	05/30/1996	Soil	33.7	41.8	46.2	39.2	13.7	0.55	13.5
R49-96 15-21"	05/31/1996	Soil	83.5	105	128	62.7	22.3	1.1	21.9
R50-96 0-3"	05/31/1996	Soil	17.7	17.2	19.1	37.2	12.1	0.59	12.6
R51-96 0-3"	05/30/1996	Soil	1.9	1.7	1.5	3.2	0.97	0.07U	1.0
R51-96 21-27"	06/03/1996	Soil	1.4	1.4	1.5	3.5	0.98	0.06U	1.2
R52-96 0-3"	05/30/1996	Soil	1.4	1.3	1.6	2.9	1.2	0.06U	1.2
R53-96 0-3"	05/30/1996	Soil	9.4	11.9	13.6	11.3	3.8	0.29	3.6
R54-96 0-3"	06/03/1996	Soil	2.8	1.9	2.1	3.7	1.2	0.07	1.2
R55-96 0-3"	06/03/1996	Soil	14.1	17.5	17.5	24.5	8.2	0.39	8.6
R55-96 15-21"	06/03/1996	Soil	113	105	124	31.8	11.7	0.45	10.6
R56-96 0-3"	06/03/1996	Soil	1.5	0.77	1.1	1.9	0.66	0.08	0.82
R56-96 3-6"	06/03/1996	Soil	2.0	1.8	1.8	3.0	0.93	0.05U	0.96
R57-96 0-3"	06/03/1996	Soil	1.4	1.4	1.6	11.6	3.7	0.17	3.8
R57-96 21-27"	06/03/1996	Soil	85.0	87.3	113	36.7	12.9	0.65	12.7
R57-96 21-27" (Dup)	06/03/1996	Soil	90.5	86.6	132	39.3	12.9	0.61	12.9
R58-96 0-3"	06/03/1996	Soil	4.8	4.2	4.8	7.6	2.5	0.17	2.4
R59-96 0-3"	06/04/1996	Soil	10.2	11.0	14.3	17.6	5.8	0.30	6.1
R60-96 0-3"	06/04/1996	Soil	2.6	1.7	1.8	3.3	1.1	0.05U	0.98
R61-96 0-3"	06/04/1996	Soil	2.1	1.1	1.4	3.2	0.95	0.11	0.99

<sup>a</sup>Definition of Qualifiers: R -- Data unusable. J -- Estimated quantity. U -- Not detected; value is sample detection limit. UJ -- Not detected, associated value is estimated.  
<sup>b</sup>Sample location followed by depth interval samples.

Table 5-2 (continued). Soil and Sediment Radionuclide Data<sup>a</sup>

Sample Location <sup>b</sup>	Sample Date	Sample Type	Pb210 (pCi/g)	Ra226 (pCi/g)	Th230 (pCi/g)	U (mg/kg)	U234 (pCi/g)	U235 (pCi/g)	U238 (pCi/g)
Downgradient - Lower Montezuma Creek									
R61-96 3-9"	06/04/1996	Soil	2.6	0.78	1.2	2.6	0.72	0.05U	0.74
R62-96 0-3"	06/04/1996	Soil	19.1	23.7	28.8	18.6	6.5	0.34	6.4
R62-96 15-21"	06/04/1996	Soil	38.8	52.8	55.7	38.2	12.5	0.54	12.5
R63-96 0-3"	06/04/1996	Soil	1.9	1.7	1.8	2.9	0.94	0.06	0.99
R63-96 3-9"	06/04/1996	Soil	1.4U	1.1	0.99	2.6	0.78	0.09	0.93
R64-96 0-3"	06/04/1996	Soil	12.1	17.8	19.9	15.6	5.2	0.25	5.1
R65-96 0-3"	06/04/1996	Soil	1.4U	1.3	1.5	2.4	0.65	0.06U	0.88
R66-96 0-3"	06/04/1996	Soil	1.4U	0.90	0.95	2.4	0.69	0.06U	0.79
R67-96 0-3"	06/04/1996	Soil	6.3	7.3	9.2	10.6	3.6	0.22	3.7
R67-96 9-15"	06/04/1996	Soil	27.4	53.0	54.3	25.9	8.1	0.47	8.6
R68-96 0-3"	06/04/1996	Soil	1.4U	1.2	1.3	2.7	0.87	0.08U	0.83
R69-96 0-3"	06/04/1996	Soil	5.6	7.1	7.1	15.5	5.0	0.22	4.9
R69-96 15-21"	06/04/1996	Soil	76.0	142	142	66.8	22.9	1.3	23.5
R70-96 0-3"	06/04/1996	Soil	1.9	0.99	1.4	5.8	1.9	0.16	2.0
R70-96 9-15"	06/04/1996	Soil	48.3	68.9	98.5	36.0	12.1	0.55	11.9
R71-96 0-3"	06/04/1996	Soil	3.0	2.9	4.0	4.9	1.7	0.13	1.7
R71-96 9-15"	06/04/1996	Soil	34.1	40.4	51.0	30.1	10.2	0.40	10.4
R72-96 0-3"	06/04/1996	Soil	2.0	1.6	1.9	3.2	0.98	0.09	1.0
R72-96 3-9"	06/04/1996	Soil	2.2	3.9	2.7	4.6	1.6	0.04	1.5
R73-96 0-3"	06/04/1996	Soil	2.4	1.5	1.8	3.3	1.1	0.08	1.1
R74-96 0-3"	06/04/1996	Soil	66.7	120	145	83.4	26.4	1.2	26.5
R74-96 0-3" (Dup)	06/04/1996	Soil	60.9	108	149	78.4	26.9	1.2	27.6
R74-96 3-9"	06/04/1996	Soil	16.9	21.6	27.6	21.0	7.2	0.30	7.8
R75-96 0-3"	06/04/1996	Soil	1.6U	1.9	2.0	3.9	1.2	0.09	1.2
R75-96 3-9"	06/04/1996	Soil	3.2	3.1	3.2	5.4	1.8	0.10	1.7
R76-96 0-3"	06/04/1996	Soil	1.6U	1.7	1.7	3.3	1.1	0.08	1.2
R76-96 9-15"	06/04/1996	Soil	7.7	13.8	12.5	8.4	2.8	0.17	2.6
R77-96 0-3"	06/04/1996	Soil	1.5	2.2	2.2	4.3	1.2	0.08	1.5
R78-96 0-3"	06/04/1996	Soil	1.4U	1.0	1.1	2.8	0.87	0.11	0.96
R78-96 3-9"	06/04/1996	Soil	2.4	2.4	2.8	6.2	1.9	0.07	2.1
R79-96 0-3"	06/04/1996	Soil	17.5	21.8	30.5	18.3	5.8	0.28	5.8
R80-96 0-3"	06/05/1996	Soil	1.7U	1.5	2.2	3.5	1.2	0.07	1.2
R80-96 3-9"	06/05/1996	Soil	2.4	2.7	3.0	4.9	1.6	0.06U	1.8
R81-96 0-3"	06/05/1996	Soil	10.1	15.0	16.0	15.2	5.1	0.22	5.3
R82-96 0-3"	06/05/1996	Soil	8.6	10.3	9.6	17.4	6.0	0.23	5.8
R83-96 0-3"	06/05/1996	Soil	1.5U	1.4	1.5	2.9	0.98	0.05	1.1
R83-96 3-9"	06/05/1996	Soil	1.5U	1.3	1.2	2.5	0.81	0.05	0.86
R84-96 0-3"	06/05/1996	Soil	45.8	61.9	77.9	46.3	14.9	0.67	15.1

<sup>a</sup>Definition of Qualifiers: R -- Data unusable. J -- Estimated quantity. U -- Not detected; value is sample detection limit. W -- Not detected, associated value is estimated.  
<sup>b</sup>Sample location followed by depth interval sampled.

Table 5-2 (continued). Soil and Sediment Radionuclide Data<sup>a</sup>

Sample Location <sup>b</sup>	Sample Date	Sample Type	Pb210 (pCi/g)	Ra226 (pCi/g)	Th230 (pCi/g)	U (mg/kg)	U234 (pCi/g)	U235 (pCi/g)	U238 (pCi/g)
<b>Downgradient - Lower Montezuma Creek</b>									
R84-96 3-9"	06/05/1996	Soil	20.6	31.2	39.1	26.8	9.9	0.35	9.4
R85-96 0-3"	06/05/1996	Soil	2.5	1.7	2.1	3.0	0.96	0.07	0.89
R86-96 0-3"	06/05/1996	Soil	14.6	16.7	25.5	12.6	4.3	0.15	4.2
R86-96 3-9"	06/05/1996	Soil	9.9	12.8	15.3	10.7	3.8	0.14	4.0
R87-96 0-3"	06/05/1996	Soil	1.5	1.3	1.4	4.3	1.4	0.07	1.6
R87-96 0-3" (Dup)	06/05/1996	Soil	1.4U	1.2	1.2	3.9	1.2	0.07	1.4
R89-96 0-3"	06/05/1996	Soil	3.1	2.1	2.3	5.9	2.0	0.09	1.9
R89-96 3-9"	06/05/1996	Soil	1.7	2.2	2.6	4.7	1.5	0.10	1.7
R91-96 0-3"	06/05/1996	Soil	2.5	1.3	1.5	3.2	2.4	0.13	2.4
SS94-012 0-6"	11/11/1994	Soil	9.0	9.0	15.4	18.9	No Data	No Data	No Data
SS94-012 6-12"	11/11/1994	Soil	17.4	11.4	26.2	20.9	No Data	No Data	No Data
SS94-012 12-18"	11/11/1994	Soil	21.3	11.0	37.9	22.2	No Data	No Data	No Data
SS94-012 18-24"	11/11/1994	Soil	70.5	46.2	116	45.3	No Data	No Data	No Data
SS94-013 0-6"	11/11/1994	Soil	10.5	3.9	24.6	26.5	No Data	No Data	No Data
SS94-013 6-12"	11/11/1994	Soil	78.7	36.7	100	25.7	No Data	No Data	No Data
SS94-013 12-18"	11/11/1994	Soil	113	60.2	145	66.6	No Data	No Data	No Data
SS94-013 18-24"	11/11/1994	Soil	47.2	23.9	65.5	73.2	No Data	No Data	No Data
SS94-014 0-6"	11/11/1994	Soil	9.7	3.4	3.0	8.5	No Data	No Data	No Data

<sup>a</sup>Definition of Qualifiers: R -- Data unusable. J -- Estimated quantity. U -- Not detected; value is sample detection limit. WJ -- Not detected, associated value is estimated.

<sup>b</sup>Sample location followed by depth interval sampled.



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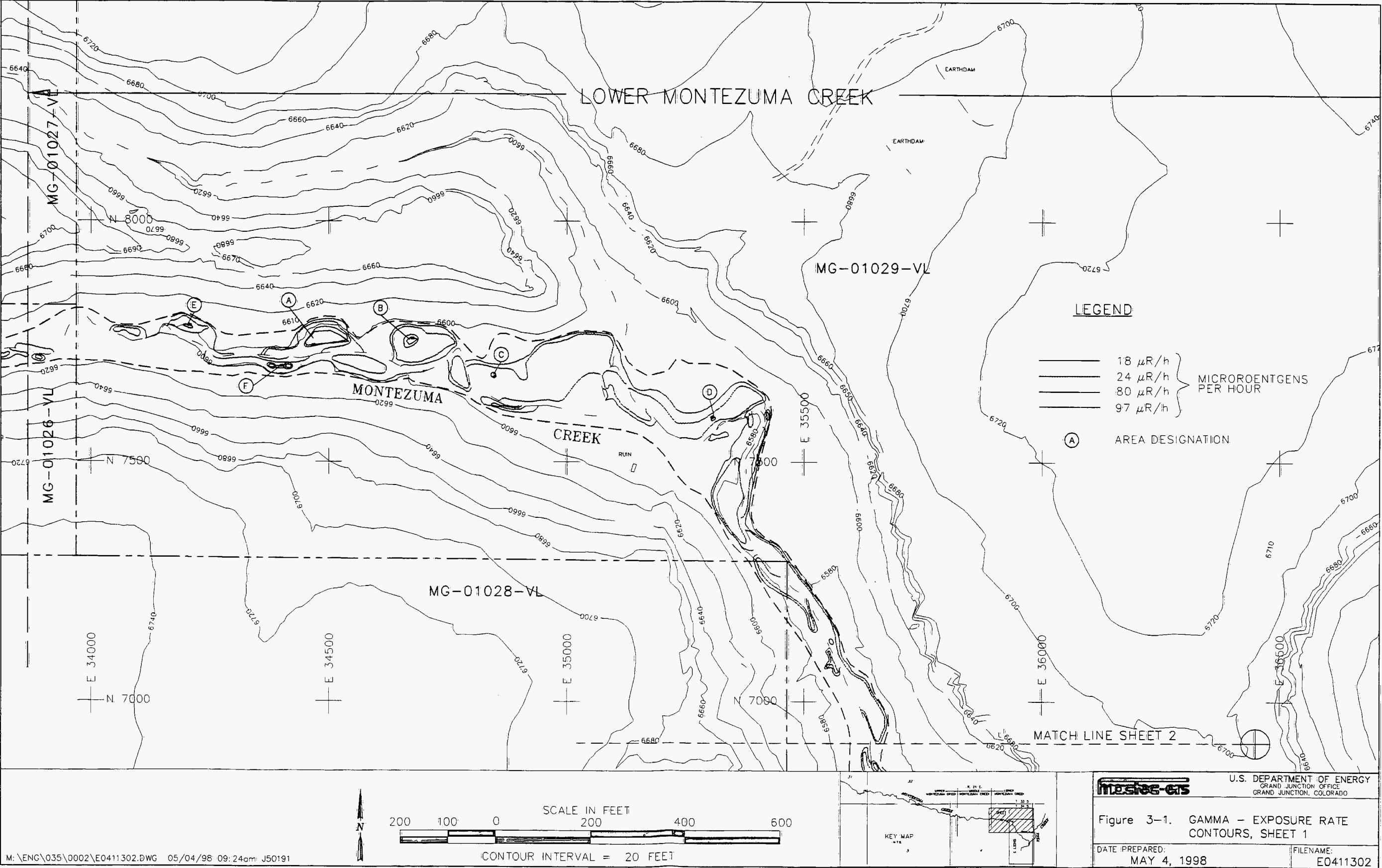


Figure 3-1. Gamma Exposure Rate Contours (Sheet 1)

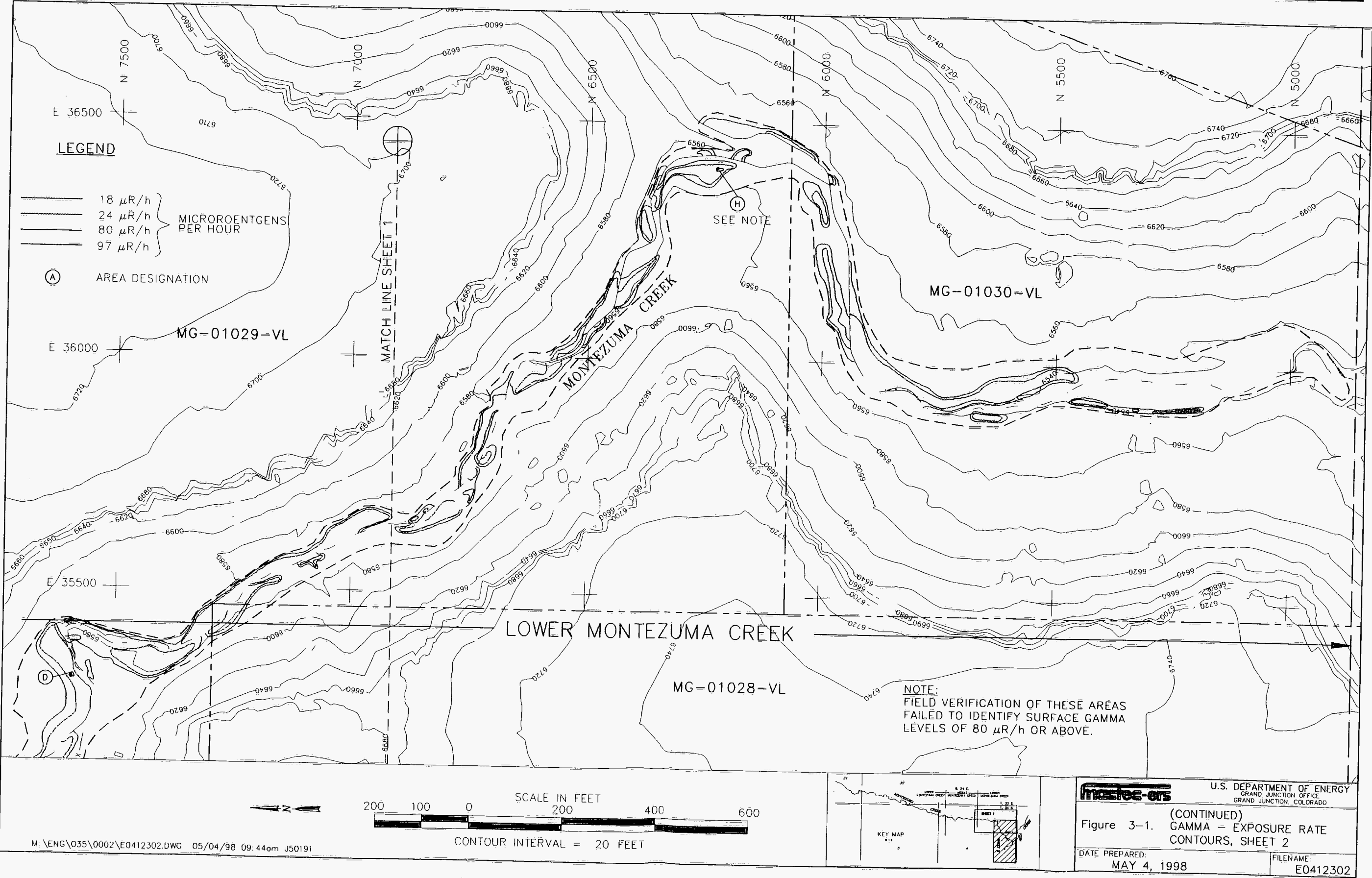


Figure 3-1 (continued). Gamma Exposure Rate Contours (Sheet 2)

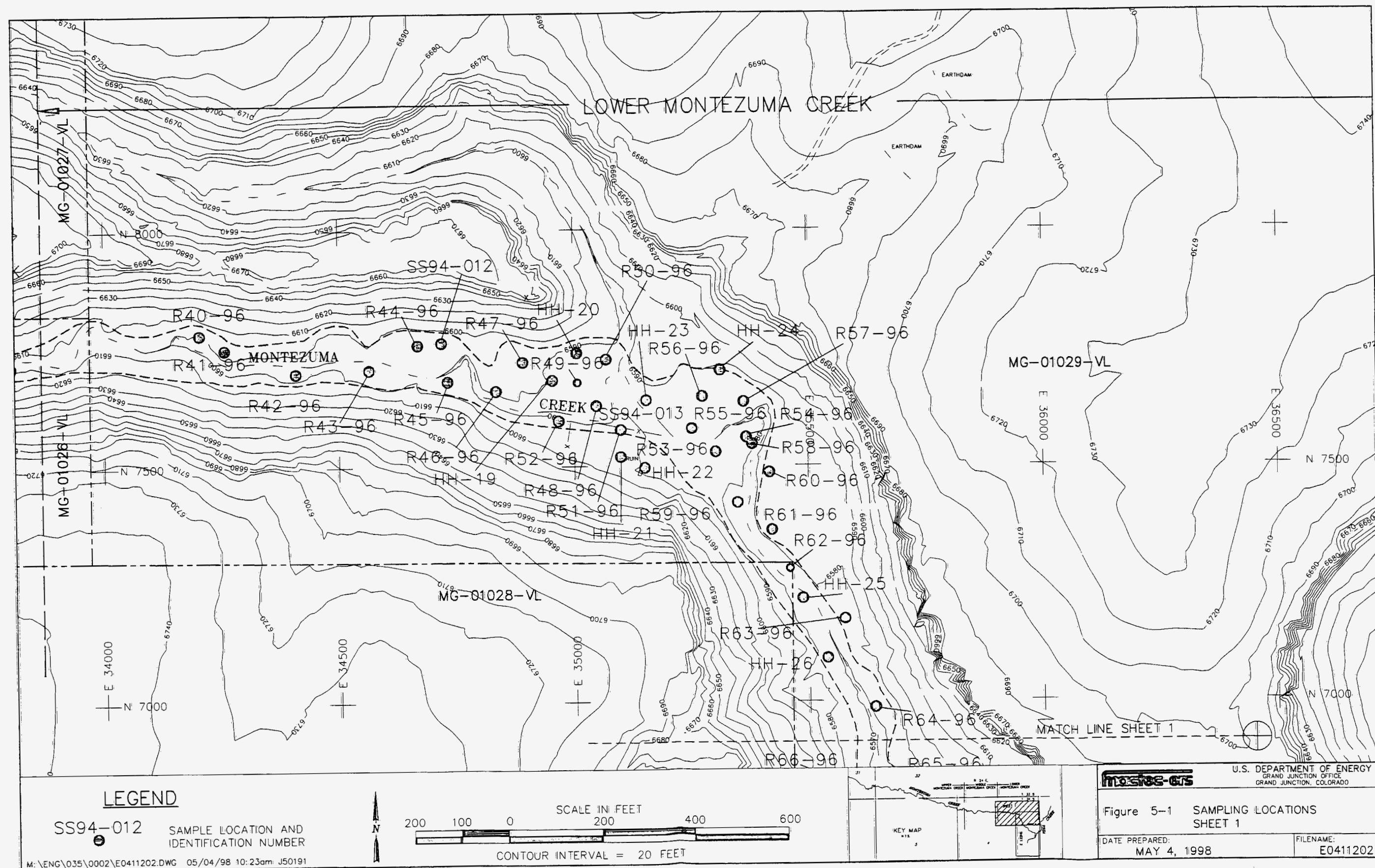


Figure 5-1. Sampling Locations (Sheet 1)

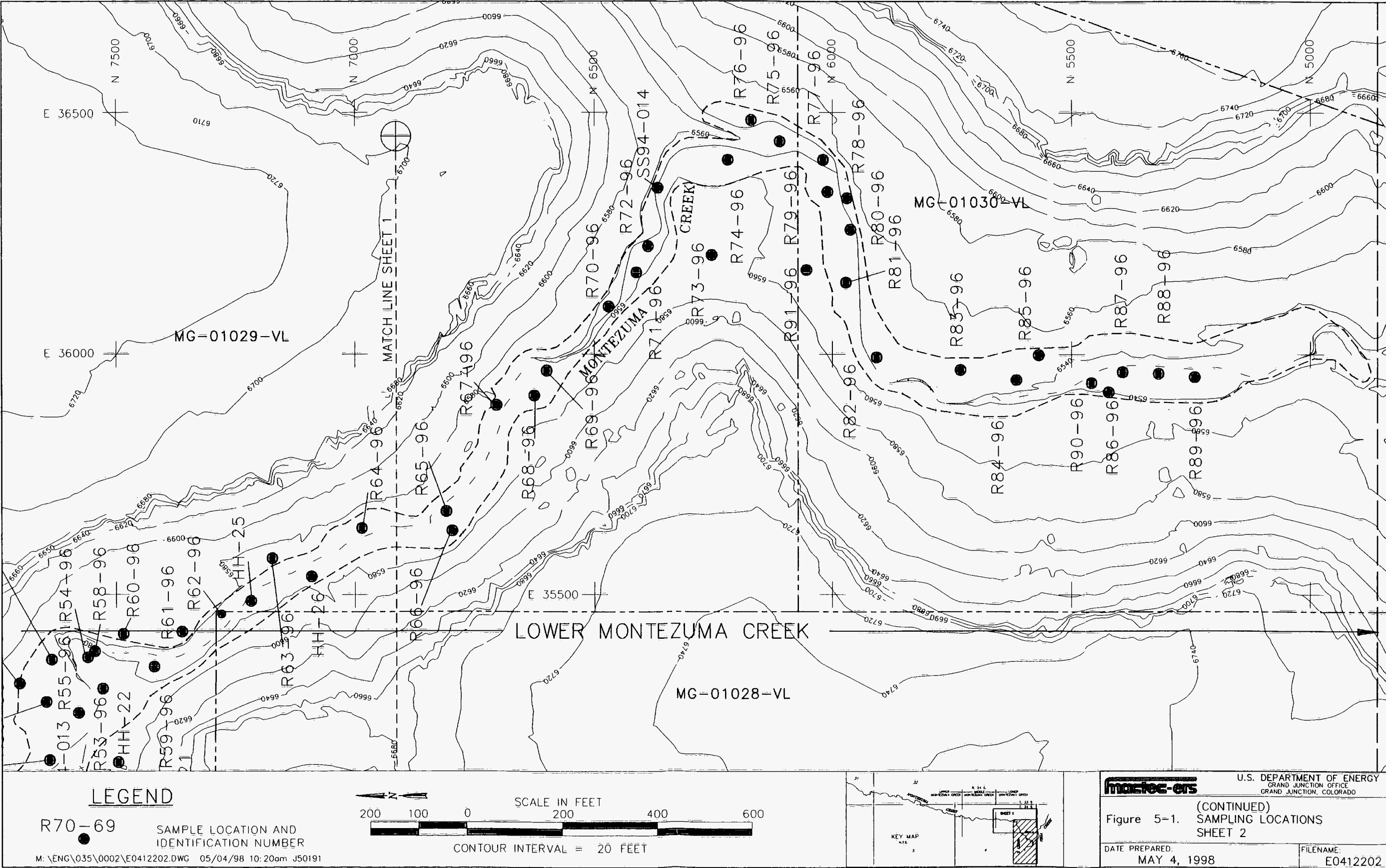


Figure 5-1 (continued). Sampling Locations (Sheet 2)



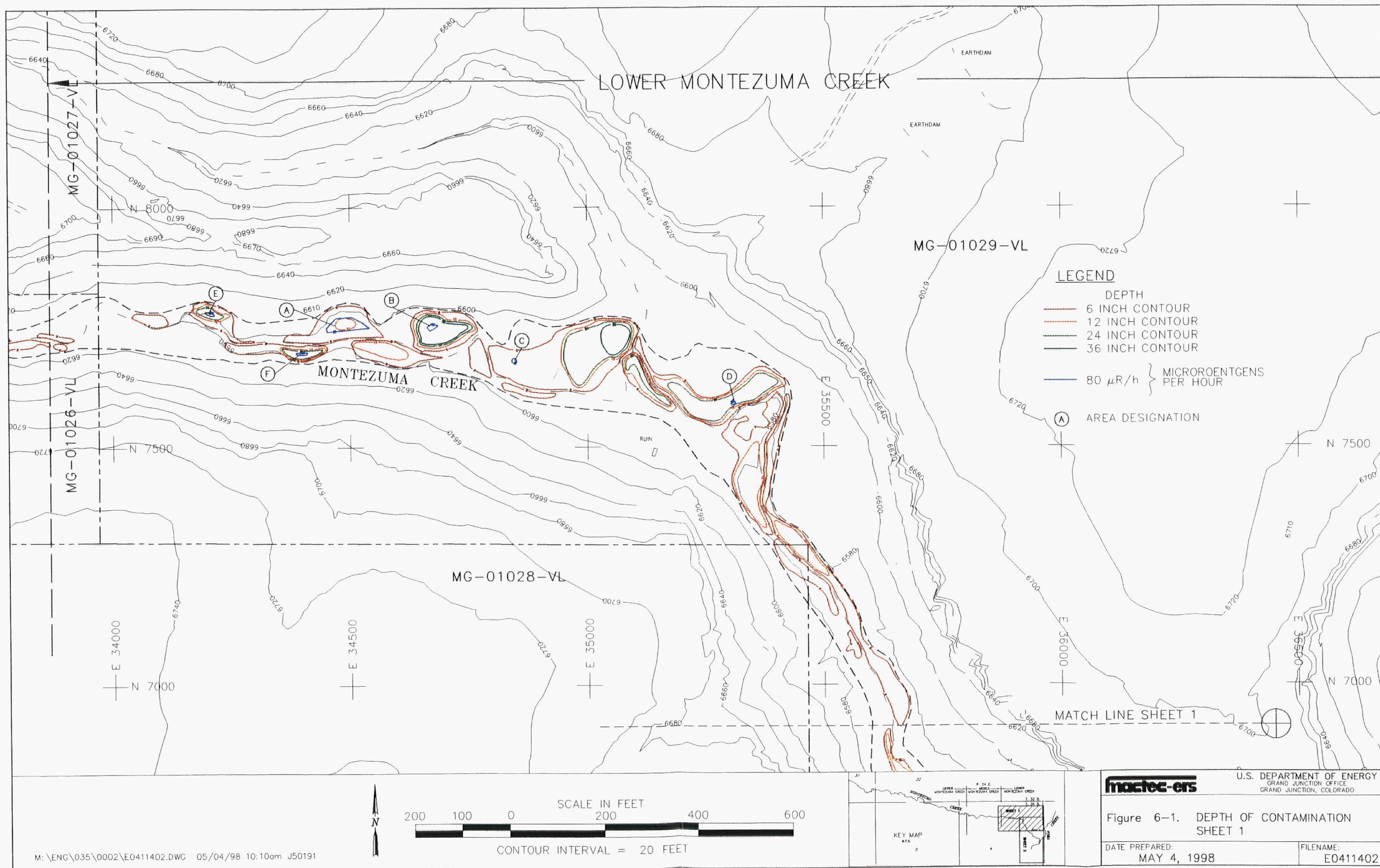


Figure 6-1. Depth of Contamination (Sheet 1)



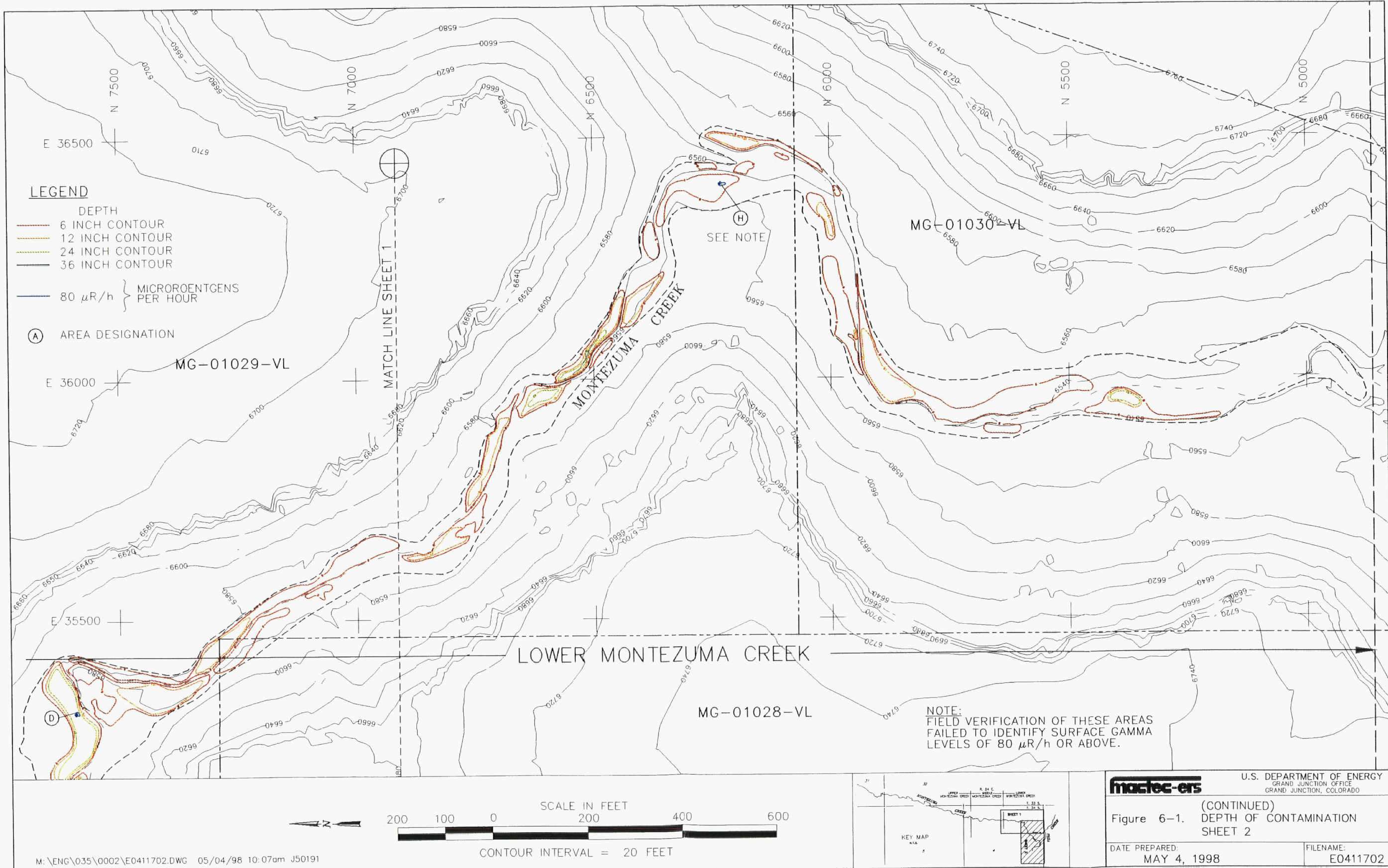


Figure 6-1 (continued). Depth of Contamination (Sheet 2)

## **Appendix B**

### **Evaluation of Applicable or Relevant and Appropriate Requirements**



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## Evaluation of Applicable or Relevant and Appropriate Requirements

This section presents an evaluation of applicable or relevant and appropriate requirements (ARARs) for contaminated soil and sediment deposited on three properties in the Lower Montezuma Creek area (MG-01028-VL, MG-01029-VL and MG-01030-VL). These properties are included in Operable Unit (OU) III of the Monticello Mill Tailings Site (MMTS). This section uses the *Monticello Mill Tailings Site Operable Unit III, Alternatives Analysis* (DOE 1997) ARARs evaluation and focuses it on the Lower Montezuma Creek soil and sediment removal action.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response action for the soil and sediment portion of OU III must comply with chemical-, location-, and action-specific ARARs and attain a degree of cleanup that ensures protection of human health and the environment. ARAR compliance must be met during the response as well as at its completion. In addition, remediation that leaves any hazardous substance, pollutant, or contaminant on site must meet a level or standard of control that at least attains standards, requirements, limitations, or criteria that are identified as ARARs for the site. Only substantive requirements must be met for on-site CERCLA activities; both substantive and administrative requirements must be met for off-site activities.

Chemical-specific ARARs set health- or risk-based concentration limits for particular hazardous substances or contaminants in media such as air, soil, and water. The principal contaminants of concern associated with the Lower Montezuma Creek removal design are radioactive and nonradioactive substances associated with uranium and vanadium mill tailings. Location-specific ARARs establish additional requirements on the basis of unique characteristics of a site that could be affected as a result of removal action. These ARARs may be used to restrict or preclude certain activities or removal actions on the basis of location or characteristics of a site. Action-specific ARARs are performance, design, and other requirements that control removal actions. These requirements are not concerned with contaminants present or with site characteristics and location, but address how removal action alternatives must be achieved. Action-specific requirements may specify particular performance levels, actions, or technologies, as well as specific levels (or a methodology for setting specific levels) for discharged or residual contaminants.

Section B.1.0 addresses Federal ARARs; Section B.2.0 addresses State ARARs; and Section B.3.0 addresses "To Be Considered" criteria.

### B.1.0 Federal ARARs

This section addresses Federal requirements and identifies how each may pertain to the Lower Montezuma Creek removal action.

#### *Safe Drinking Water Act*

The requirements of the Safe Drinking Water Act (SDWA) and its corresponding regulations address public water systems. The requirements are implemented by the State through a Federally approved program under the SDWA.

#### *Federal Water Pollution Control Act, as Amended by the Clean Water Act*

**Water-Quality Criteria**—The water-quality criteria of this act and its corresponding regulations set water-quality standards on the basis of toxicity to aquatic organisms and human health, and regulate storm-water runoff discharges. The requirements are implemented by the State through federally

approved programs under the Clean Water Act (CWA). The corresponding determination of ARARs is discussed in Section B.2.0 (Water Quality Rules, Standards for Quality for Water of the State, Groundwater Quality Protection, Underground Injection Control Program, and Utah Pollutant Discharge Elimination System).

**Dredge or Fill Requirements (Section 404 of the Clean Water Act)**—The provisions of 40 CFR 230 and 231 and 33 CFR 323 regulate activities associated with discharging dredged or fill material into waters of the United States. Navigable waters and isolated wetlands are protected under the jurisdiction of the U.S. Army Corps of Engineers (COE). A general permit (GP-40) was issued by the COE to the State of Utah authorizing the State Engineer to regulate the discharge of dredged or fill material into Utah streams. See the discussion in Section B.2.0 for an ARARs determination.

For CERCLA sites, the discharge of dredged or fill materials into waters of the U.S. (including wetland areas) is regulated by EPA rather than the COE. Wetland areas were identified and delineated throughout OU III. The *Guidelines of the Monticello Wetlands Master Plan* (DOE 1996), which was developed to adhere to these applicable location- and action-specific requirements and which was approved by EPA, will be followed for any wetland-area disturbance, remediation, and restoration activities should they inadvertently occur in association with this soil and sediment remedy.

#### ***Clean Air Act***

The requirements of this act and its corresponding regulations seek to protect and enhance the quality of the nation's air to protect public health and welfare and the productive capacity of the nation's population. The requirements are implemented by the State through the federally approved program under the Clean Air Act.

#### ***Resource Conservation and Recovery Act***

The requirements of this act and its corresponding regulations address the generation and management of hazardous waste. The requirements are implemented by the State through the federally approved program under RCRA, as amended.

#### ***Uranium Mill Tailings Radiation Control Act***

The requirements of this act and its corresponding regulations, promulgated at 40 CFR Part 192, are not applicable because the site does not meet the statutory or jurisdictional prerequisites that are applicable only to 24 specifically identified inactive uranium mill and tailings sites. However, because mill tailing contaminants have been dispersed into the environment from an inactive uranium processing site, these Federal requirements are relevant and appropriate chemical- and action-specific requirements for this removal action.

Cleanup standards for removal actions at inactive uranium processing sites are included in these requirements. These cleanup standards specifically apply to radium-226 (Ra-226) for land, and radon decay products and gamma radiation for buildings. 40 CFR 192.21 addresses criteria for which these cleanup standards can be changed to supplemental standards. Because the Ra-226 cleanup standards of 5/15 pCi/g Ra-226 are not met throughout the Lower Montezuma Creek by this removal action, the application for supplemental standards will be necessary. Under these requirements, supplemental standards may be applied if remediation to 5/15 pCi/g Ra-226 would directly produce environmental harm that is clearly excessive compared to the health benefits received from remediation. Remediation to the Ra-226 standards would require a significant amount of excavation in environmentally sensitive areas and would adversely affect wetland areas and the habitat of ecological receptors. The action levels

included in this removal action reduce the amount of excavation required in the most environmentally sensitive areas to mitigate the adverse environmental effects of remediating to the 5/15 pCi/g Ra-226 standard and are protective of human health and the environment. The use of institutional controls also is required when supplemental standards are applied; restrictive easements will be used as the institutional control to ensure that habitable structures are not built within the OU III portion of Lower Montezuma Creek.

### ***National Historic Preservation Act***

The regulations implementing this act and its corresponding regulations at 40 CFR 6.301(b) require Federal agencies to take into account the effect of any federally assisted undertaking or licensing on a structure or object that is included on or eligible to the National Register of Historic Places (NRHP). The removal action planned for the lower portion of Montezuma Creek will not impact or have any effect upon any structure or object that is included on or eligible to the NRHP. Therefore, these requirements are neither applicable nor relevant and appropriate to this removal action.

### ***Archaeological and Historical Preservation Act***

This act and its corresponding regulations establish procedures to provide for the preservation of historical and archaeological resources that may be destroyed through alteration of terrain as a result of a Federal construction project or a federally licensed activity or program. On the basis of recent archaeological survey results, removal actions identified in the engineering design for these properties (i.e., MG-01028-VL, MG-01029-VL, and MG-01030-VL) will have no impact on any known archaeological site; however, due to the relatively close proximity of the construction work to known archaeological resources/sites located in Montezuma Canyon, the potential exists to encounter a subsurface (unknown) archaeological site during removal activities. Therefore, these Federal regulations are considered applicable action- and location-specific requirements for removal activities associated with OU III.

### ***Fish and Wildlife Coordination Act***

This act and its corresponding regulations require consultation with the U.S. Fish and Wildlife Service whenever a Federal department or agency proposes or authorizes modification of any stream or other body of water and requires adequate provisions for the protection of fish and wildlife resources. Recent flora and fauna surveys identified no fish in Montezuma Creek within OU III, but showed that there may be temporary short-term loss of habitat for wildlife if the Montezuma Creek channel is modified. The removal actions identified in this design do not include such actions as stream channel alteration/modifications, stream channel crossings, construction of impoundment structures, etc., and therefore, should have no impact to the Montezuma Creek stream channel. During construction activities, and prior to revegetation of disturbed areas, there may be a short-term loss of habitat for wildlife due to the disturbance and removal of vegetation associated with the areas of contamination. Consequently, these Federal requirements are relevant and appropriate location- and action-specific requirements for the removal actions associated with this design.

### ***Endangered Species Act***

This act and its corresponding regulations require that Federal agencies ensure that any action authorized, funded, or carried out by such agencies is not likely to jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat required for the continued existence of that species. DOE currently is conducting surveys to determine if threatened or endangered species are present in Montezuma Creek. To date, no threatened or endangered species were

identified at or near the MMTS or within OU III; however, these requirements are applicable location- and action-specific Federal requirements if threatened or endangered species are identified.

Flows to the San Juan River (and its tributaries) are protected under this act because endangered fish reside in the river. DOE is committed to designing its response action to ensure minimal (less than 100 acre-feet per year) depletion of flow to the San Juan River. Because the removal action for Lower Montezuma Creek does not necessitate rerouting the creek or any work within the stream channel, flows to Montezuma Creek (which is tributary to the San Juan River) will not be affected. Consequently, removal activities occurring in the lower portion of Montezuma Creek should have no impact to flows in the San Juan River.

#### ***Bald and Golden Eagle Protection Act***

This act and its corresponding regulations, which are administered by the U.S. Fish and Wildlife Service, provide for the preservation of the bald eagle and golden eagle through the protection of the individual raptor and its progeny. On the basis of survey information, neither bald nor golden eagles reside at or near the MMTS. Therefore, these Federal requirements are not applicable nor relevant and appropriate to the implementation of this removal action.

#### ***Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands)***

These Presidential orders and their corresponding regulations require Federal agencies to evaluate actions they may take to avoid, to the maximum extent possible, adverse effects associated with direct and indirect development of a floodplain or wetland. The 10 CFR 1022 "Compliance with Floodplain/Wetlands Environmental Review Requirements" were issued to implement the requirements of Executive Orders 11988 and 11990. Activities associated with this removal action may affect site floodplains and wetlands. Therefore, these orders and their corresponding regulations are applicable Federal location- and action-specific requirements.

#### ***Farmland Protection Policy Act***

The purpose of this act and its corresponding regulations is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of prime, unique, or important farmlands to nonagricultural uses. This requirement is administered through the U.S. National Resource Conservation Service. Because prime, unique, or important farmlands are not located within OU III, these Federal requirements are not applicable, relevant, or appropriate to this removal action.

#### ***National Environmental Policy Act (NEPA)***

The National Environmental Policy Act (NEPA) and its corresponding regulations are relevant and appropriate location- and action-specific Federal requirements for all federally funded projects and programs, including any activities associated with the soil and sediment selected remedy. Additional guidance that would be considered under NEPA includes regulations in the "Council on Environmental Quality" (40 CFR Part 1500); DOE NEPA regulations (10 CFR 1021); DOE Order 451.1, *Implementation of NEPA*; and *Secretarial Policy Statement on the National Environmental Policy Act* (issued June 1994). NEPA values have been and will be incorporated in the CERCLA documentation.

### **B.2.0 State of Utah ARARs**

Because the MMTS is located in Utah, compliance with all State-specific environmental rules, regulations, standards, criteria, or limitations that are applicable or relevant and appropriate to OU III is

mandatory. This section addresses State requirements and identifies how each may pertain to the Lower Montezuma Creek removal action. It is understood that the authorization process for allowing a State to implement a Federal program is generally a phased process. Because of this, the State may not have adopted a specific rule or portion of a regulatory program. In such instances, if a nonadopted rule or regulation in a State-implemented program is an ARAR, the Federal standards will apply.

### *Drinking Water*

**Drinking Water Rules**—These rules represent the State's implemented version of the Federal Safe Drinking Water Act's National Primary and Secondary Drinking Water Regulations, which contain criteria and procedures to ensure a supply of drinking water that complies with established maximum contaminant levels. These rules include quality control and testing procedures that ensure proper operation and maintenance of a potable public water supply system; they specify the minimum quality of water that may be taken into the system, and they provide siting requirements for new facilities for public water systems. The rules also establish maximum contaminant levels that may be considered when establishing cleanup standards. Because the OU III alluvial aquifer is not used as a public water supply system, and because the alluvial aquifer will not be directly or adversely affected by this remediation (i.e., soil and sediment removal below groundwater will not occur), the Utah Drinking Water Rules are not applicable, relevant, or appropriate to this removal action.

### *Water Quality*

The following regulations comprise the Utah State-implemented version of the Federal Clean Water Act program.

**Water Quality Rules**—The definitions for water pollution and the general requirements are not applicable or relevant and appropriate requirements for the selected soil and sediment remedy. Water quality will not be directly affected by this removal action.

**Standards for Quality for Water of the State**—The Clean Water Act provides criteria for states to set water-quality standards on the basis of toxicity to aquatic organisms and human health. Because the remediation of contamination in the Lower Montezuma Creek area will not result in a discharge of contaminants to the creek, these rules are not applicable or relevant and appropriate to the construction/removal activities identified in this removal action.

**Utah Pollutant Discharge Elimination System (UPDES)**—The UPDES rules address point-source discharges of pollutants and storm-water runoff discharges into Utah waterways. They also address the use of injection wells (i.e., underground discharges of water) through the Underground Injection Control Program. These rules are not applicable or relevant and appropriate requirements since there is no point-source discharge into Montezuma Creek or use of underground injection wells in association with the soil and sediment remediation of the Lower Montezuma Creek area. Additionally, because the total area of disturbance for this project is less than 5 acres, the UPDES storm-water runoff rules are not applicable State requirements; however, controlling sediment-laden runoff from the construction sites is considered to be a relevant and appropriate contaminant-specific requirement to the construction activities identified in this removal action.

**Groundwater Quality Protection**—Utah-specific groundwater protection standards are addressed by this rule. An equivalent Federal program does not exist. These groundwater rules are applicable chemical-, location-, and action-specific State requirements for the surface-water and groundwater media in OU III and the corresponding selected remedy. However, these requirements are not applicable,

relevant, or appropriate for this soil and sediment removal action because surface water discharges will not occur nor will the alluvial aquifer be directly or adversely affected by this removal action.

**Dredge or Fill Requirements (Section 404)**—These rules, which are implemented by the State Engineer, are applicable location- and action-specific requirements for any dredge or fill activities in Montezuma Creek, including stream channel alterations, associated with the OU III soil and sediment remedy. Because the removal action for this property does not involve dredge and fill, stream channel alteration/modification, or stream channel crossing activities, these requirements are neither applicable nor relevant and appropriate requirements to the construction activities described in this removal action. Neither a Section 404 permit application nor a stream channel alteration permit application is required to accompany this removal action.

### *Air Quality*

The *Utah Air Conservation Rules* address the prevention and control of air pollution sources in Utah and establish air-quality emission standards and monitoring requirements. Because air emissions may occur as fugitive dust generated through the clearing of land, remediation of soil and sediment, use of construction equipment, and the construction and use of haul roads, the State-implemented version of the Federal National Primary and Secondary Ambient Air Quality Standards program, which establishes standards for ambient air quality, is an applicable chemical-, location-, and action-specific State requirement for the Lower Montezuma Creek removal action.

### *Utah Hazardous Waste and Underground Storage Tank Management*

Subpart C of RCRA addresses the generation, treatment, storage, disposal, and transportation of hazardous waste. A provision in 40 CFR 261.4(a)(4) excludes mill tailings (source, special nuclear, or by-product material, as defined by the Atomic Energy Act of 1954) from meeting the definition of a hazardous waste. Subpart I of RCRA regulates underground storage tanks (USTs) that are used to store regulated substances. On the basis of historical land-use knowledge and field investigations, it is very unlikely that hazardous waste or USTs will be encountered within OU III. However, hazardous waste may be generated during the implementation of the OU III selected remedy. Therefore, the hazardous waste rules are applicable chemical-, location-, and action-specific State requirements if hazardous waste is discovered or generated. Additionally, to the extent possible, hazardous waste will be managed in accordance with the *Monticello Removal Action Project, Special Waste Management Plan for the Monticello Mill Tailings Site and Vicinity Properties* (DOE 1997d). The State underground storage tank (UST) requirements are not applicable nor relevant and appropriate to this removal action.

### *Corrective Action Cleanup Standards Policy for CERCLA and Underground Storage Tank Sites*

This is a Utah-specific requirement which establishes a cleanup standards policy for CERCLA and UST sites. The policy sets forth criteria for establishing cleanup standards and requires source control or removal, and prevention of further degradation. This policy is an applicable chemical-, location-, and action-specific State requirement for this removal action.

### *Radiation Control*

The Utah Radiation Control rules address the management, including disposal and transportation, of radioactive materials. They also address standards for protection against radiation and licensing requirements. These rules are applicable chemical- and action-specific State requirements for this removal action.



### ***Utah State History***

These requirements address the protection of archaeological, anthropological, and paleontological resources on State lands and protection of these resources when they are associated with projects conducted or approved by State agencies. These location- and action-specific State requirements are applicable to activities associated with this removal action.

### ***Water Rights***

The soil and sediment selected remedy described in this removal action for the Lower Montezuma Creek area does not involve well installation and/or abandonment activities, or other consumptive uses (e.g., evaporative loss through impoundment, diversion, dust suppression, etc.) of water. Therefore, these requirements are considered to be neither applicable nor relevant and appropriate State requirements for the construction activities necessitated by this removal action. An "Application to Appropriate Water" is not required to accompany this removal action for the soil and sediment remedy.

## **B.3.0 To Be Considered Criteria**

In addition to the legally binding laws and regulations discussed in Section B.1.0 and B.2.0, environmental and public health programs also develop criteria, advisories, guidance, and proposed standards that are not legally binding, but may provide useful information and recommended procedures. This section addresses such "To Be Considered" criteria that may be useful to help set cleanup-level targets and to ensure that the removal action is protective of human health and the environment.

### ***Radiological Criteria for License Termination***

In the Federal Register, Volume 62, July 21, 1997, the Nuclear Regulatory Commission (NRC) revised several regulations (10 CFR 20, 30, 40, 50, 51, 70, and 72) to provide specific radiological criteria for decommissioning lands and structures at NRC licensed facilities and facilities subject to NRC's jurisdiction. The NRC established a dose of 25 mrem/yr (from all man-made sources, excluding medical) as an acceptable criterion for release of any site for unrestricted use without further analysis of the potential for exposures from other man-made sources. The 25 mrem/yr dose is a To Be Considered criteria for the radiologically contaminated soil and sediment remedy addressed in this removal action.



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